AMENDMENTS TO THE DRAWINGS

Please replace the original drawing sheets 1-3 with the enclosed sheets 1-3, each labeled "Replacement Sheet." These replacement sheets of drawings do not contain any new matter. The new sheets include subject matter as supported in the original FIGS. 1-3. The replacement sheets simply include corrections to make informal drawings formal.

2

allowance. In view of the foregoing amendments and the following remarks, the Applicant respectfully request reconsideration and allowance of all pending claims.

On a preliminary note, the Applicant stresses that the present Office Action is insufficient to establish a *prima facie* case of non-patentability. The Office Action did not specifically address each pending claim and/or identify passages in the cited references that could hypothetically correspond to the claimed subject matter. 37 C.F.R. § 1.104 specifically states:

> (b) Completeness of examiner's action. The examiner's action will be complete as to all matters, except that in appropriate circumstances, such as misjoinder of invention, fundamental defects in the application, and the like, the action of the examiner may be limited to such matters before further action is made. However, matters of form need not be raised by the examiner until a claim is found allowable.

In the Manual of Patent Examining Procedure, Section 707.07(d) states that omnibus rejections are improper, and Section 707.07(f) states that "to provide a complete application file history and to enhance the clarity of the prosecution history record, an examiner must provide clear explanations of all actions taken by the examiner during prosecution of an application." In view of these passages, among others, the Applicant stresses that the present Office Action is incomplete and does not establish a *prima facie* case of non-patentability of the pending claims.

The Applicant also stress that the present and previous amendments are not believed to narrow the scope of the present claims, because pending claims are unchanged. However, if these amendments narrow elements of the claims in any way, then Applicant emphasizes that it is not for reasons relating to patentability. For example, the Applicant notes that certain amendments clarify the elements of the claim, yet these amendments are neither necessary nor required by the Examiner to overcome rejections under 35 U.S.C. §§ 101, 102, 103, 112, or

10

other relevant laws relating to patentability. However, if any amendments do, *arguendo*, narrow elements of the claims for reasons relating to patentability, then the Applicants do not believe these amendments preclude application of the doctrine of equivalents in accordance with the Supreme Court's recent decision in *Festo*. *See Festo Corp. v. Shoketsu Kinzuku Kogyo Kabushiki Co.*, 62 U.S.P.Q. 2d 1705, 1714 (Sup. Ct. 2002); *see also Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 68 U.S.P.Q. 2d 1321, 1327-28 (Fed. Cir. 2003). The Applicant, as one of skill in the art, is neither aware of, nor does Applicant foresee, any equivalents to any such claim elements, which are *arguendo* narrowed for reasons relating to patentability. *See Festo*, 62 U.S.P.Q. 2d at 1714. Moreover, if any equivalents exist, *arguendo*, at the time of these amendments, then the Applicant emphasizes that the reasons for amending the particular claim element are only tangentially related to the equivalents. *See id.* Finally, if equivalents are, *arguendo*, foreseeable or directly related to the reasons for these amendments, then the Applicant respectfully asserts that shortcomings of the language, and other reasons, prevented the Applicant from adequately describing the particular equivalent. *See Festo*, 68 U.S.P.Q. 2d at 1327-28. For at least these reasons among others, the Applicant does not surrender any potentially existing or future equivalents relating to elements of the present claims.

Objection to the Drawings

In the Office Action, the Examiner objected to informal drawings, Figures 1-3. Although Applicant does not necessarily agree with the Examiner's objection, the Applicant amended the drawings as set forth above and provided on the attached Replacement Sheets. In view of this amendment, the Applicant respectfully requests the Examiner withdraw the objection to the drawings.

Claim Objections

11

In the Office Action, the Examiner objected that claimed "means" in means-plus-function format claims were unclear in the specification and drawings. Although Applicant does not necessarily agree with the Examiner's objection, the Applicant points out clear definitions of these claimed means as set forth below.

Claim 1

Claimed means:

means on-board the aircraft for obtaining a continuous determination of the aircraft's altitude from satellite-based radio navigation signals;

Clarification from the specification:

Page 2, line 4:

...the altitude determination problem has been alleviated by the Global Positioning System (GPS), a satellite-based radio navigation system using multiple satellites. By triangulation of signals from three of them, an on-board receiver can pinpoint the aircraft's current position. GPS accuracy has been significantly improved by the introduction of the Wide Area Augmentation System (WAAS), with a margin of error of only a few meters, both horizontally and vertically. WAAS provides ILS-like precision approaches to airports that do not have ILS (Instrument Landing System).

Page 2, line 22:

The altitude determination comes from a GPS/WAAS feed to a receiver connected to a computer on-board the aircraft.

Clarification from the figures:

12

3

Fig. 1:

A GPS/WAAS-enabled radio receiver R having a GPS receiver card for receiving GPS signals giving the aircraft's altitude, forward speed and magnetic heading.

Computer 15 receives, from a GPS feed 16, GPS/WAAS navigation signals which tell the instantaneous air speed of the aircraft, its altitude, and its magnetic heading to initiate voice warnings and recovery instructions to the pilot.

Fig. 2:

In box 22, altitude data are obtained from the GPS feed 16.

Fig. 3:

In box 22, altitude data are obtained from the GPS feed 16.

Claimed means:

means on-board the aircraft for obtaining a continuous determination of the aircraft's attitude from satellite-based radio navigation signals and from said solid state gyros on-board the aircraft;

Clarification from the specification:

13

Page 5, line 11:

Computer 15 receives, from a GPS feed 16, GPS/WAAS navigation signals
which tell the instantaneous air speed of the aircraft, its altitude, and its magnetic heading
to initiate voice warnings and recovery instructions to the pilot. A large delta in the
aircraft's altitude, an excursion to an unsafe altitude, a large delta in the aircraft's heading,
an increase or decrease in airspeed, or a combination of two or more of these factors will
trigger a scoring system programmed in the computer 15 to indicate an unusual attitude
and will instantly analyze this unusual attitude to initiate recovery voice instructions to
the pilot.

Clarification from the figures:

Figure 2 is a flow chart detailing the main features of the correlation algorithm for the
present system and method for critical attitude recovery of an aircraft.

In box 23, attitude data is derived from both the GPS feed 16 and the solid state
gyros 12.

Claimed means:

means on-board the aircraft for determining the roll rate of the aircraft from
satellite-based radio navigation signals and from said solid state gyros and said turn
coordinator gyro on-board the aircraft;

Clarification from the specification:

Page 3, line 2:

The roll rate determination is derived from GPS signals and from the solid state
gyros and a turn coordinator gyro on the aircraft.

14

Page 6, line 12:

...inputs from the aircraft's turn coordinator gyro 13 and its solid state gyros 12 and the GPS feed 16 are correlated to calculate the aircraft's roll rate.

Clarification from the figures:

Figure 2 is a flow chart which details the main features of the correlation algorithm which the computer 15 runs. In box 21, inputs from the aircraft's turn coordinator gyro 13 and its solid state gyros 12 and the GPS feed 16 are correlated to calculate the aircraft's roll rate, or rate of turn, which indicates the stability of flight.

Claimed means:

data processing means on-board the aircraft for processing said altitude, attitude and roll rate determinations;

Clarification from the specification:

Page 3, line 20:

a microprocessor-based computer 15 for collating and processing the information supplied to it from the receiver R, the vacuum pressure sensor 11, gyros 12 and 13, and other sources, as explained hereinafter. This computer runs an expert system algorithm

Page 5, line 11:

Computer 15 receives, from a GPS feed 16, GPS/WAAS navigation signals which tell the instantaneous air speed of the aircraft, its altitude, and its magnetic heading to initiate voice warnings and recovery instructions to the pilot. A large delta in the aircraft's altitude, an excursion to an unsafe altitude, a large delta in the aircraft's heading,

15

an increase or decrease in airspeed, or a combination of two or more of these factors will trigger a scoring system programmed in the computer 15 to indicate an unusual attitude and will instantly analyze this unusual attitude to initiate recovery voice instructions to the pilot.

Clarification from the figures:

Fig. 1:

...a microprocessor-based computer 15 for collating and processing the information supplied to it from the receiver R, the vacuum pressure sensor 11, gyros 12 and 13, and other sources.

Fig. 2:

Figure 2 is a flow chart which details the main features of the correlation algorithm which the computer 15 runs. In box 21, inputs from the aircraft's turn coordinator gyro 13 and its solid state gyros 12 and the GPS feed 16 are correlated to calculate the aircraft's roll rate, or rate of turn, which indicates the stability of flight.

Claimed means:

means on-board the aircraft responsive to said data processing means for providing corrective voice messages to the pilot.

Clarification from the specification:

Page 5, line 18:

...the computer 15 has an audio output connected to the pilot's stereo headset to deliver voice messages to one or both of the pilot's ears...

16

Page 7, line 4:

If a nose-low condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications and instructions from the computer 15 to assist him or her to restore the aircraft to safe attitude and altitude. Box 27 instructs the pilot (in both ears) to reduce the engine power. Box 28 instructs the pilot (in one ear only) to level the wings, giving voice information to the pilot's ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved. Once the wings are leveled, box 29 instructs the pilot by voice (in both ears) to gently raise the aircraft's nose and add power until a positive climb is established and the aircraft is back at the minimum safe altitude for the area it is flying over.

Conversely, if a nose-high condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications from computer 15 to recover the aircraft from this condition. Box 30 instructs the pilot (in both ears) to increase the engine power. Box 31 instructs the pilot (in both ears) to gently lower the nose of the aircraft and add power until a level attitude is established and the aircraft is back at the minimum safe altitude for the area. Box 32 instructs the pilot (in one ear) to level the wings, speaking into the ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved.

Page 8, line 16:

If the roll rate determined from the timed GPS signals becomes excessive (i.e., past the 2 minute turn standard) a voice warning to this effect is delivered to the pilot (block 34) and the pilot is given instructions (block 35) for getting the aircraft into a standard turn rate, for notifying the pilot when the standard turn rate is established, and for notifying the pilot when the aircraft passes through the eight cardinal headings.

17

Clarification from the figures:

Fig. 2:

If a nose-low condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications and instructions from the computer 15 to assist him or her to restore the aircraft to safe attitude and altitude. Box 27 instructs the pilot (in both ears) to reduce the engine power. Box 28 instructs the pilot (in one ear only) to level the wings, giving voice information to the pilot's ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved. Once the wings are leveled, box 29 instructs the pilot by voice (in both ears) to gently raise the aircraft's nose and add power until a positive climb is established and the aircraft is back at the minimum safe altitude for the area it is flying over.

Conversely, if a nose-high condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications from computer 15 to recover the aircraft from this condition. Box 30 instructs the pilot (in both ears) to increase the engine power. Box 31 instructs the pilot (in both ears) to gently lower the nose of the aircraft and add power until a level attitude is established and the aircraft is back at the minimum safe altitude for the area. Box 32 instructs the pilot (in one ear) to level the wings, speaking into the ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved.

Fig 3:

If the roll rate determined from the timed GPS signals becomes excessive (i.e., past the 2 minute turn standard) a voice warning to this effect is delivered to the pilot (block 34) and the pilot is given instructions (block 35) for getting the aircraft into a standard turn rate, for notifying the pilot when the standard turn rate is established, and for

18

notifying the pilot when the aircraft passes through the eight cardinal headings.

Claim 2

Claimed means:

data processing means includes means for detecting the magnitude and direction of any excessive altitude excursion of the aircraft in a predetermined time interval

Clarification from the specification:

Page 5, line 13:

A large delta in the aircraft's altitude, an excursion to an unsafe altitude, a large delta in the aircraft's heading, an increase or decrease in airspeed, or a combination of two or more of these factors will trigger a scoring system programmed in the computer 15 to indicate an unusual attitude and will instantly analyze this unusual attitude to initiate recovery voice instructions to the pilot.

Page 6, line 17:

In box 22, altitude data are obtained from the GPS feed 16. If no excessive altitude excursion is in progress (box 25) then no alert is indicated. For example, an altitude change greater than 500 feet per minute may be treated as excessive. Conversely, if an excessive altitude excursion is detected in combination with an excessive roll rate, a spatial disorientation event is judged to be in progress.

Clarification from the figures:

Fig. 2:

19

In box 22, altitude data are obtained from the GPS feed 16. If no excessive altitude excursion is in progress (box 25) then no alert is indicated.

Claimed means:

means for detecting any excessive roll rate of the aircraft;

Clarification from the specification:

Page 3, line 2:

The roll rate determination is derived from GPS signals and from the solid state gyros and a turn coordinator gyro on the aircraft.

Clarification from the figures:

Fig. 1:

A GPS/WAAS-enabled radio receiver R, solid state gyros 12 and a turn coordinator gyro 13 monitor the aircraft's roll rate.

Fig. 2:

In box 21, inputs from the aircraft's turn coordinator gyro 13 and its solid state gyros 12 and the GPS feed 16 are correlated to calculate the aircraft's roll rate, or rate of turn, which indicates the stability of flight.

Claimed means:

means for providing corrective voice messages to the pilot

20

Clarification from the specification:

Page 5, line 18:

...the computer 15 has an audio output connected to the pilot's stereo headset to deliver voice messages to one or both of the pilot's ears...

Page 7, line 4:

If a nose-low condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications and instructions from the computer 15 to assist him or her to restore the aircraft to safe attitude and altitude. Box 27 instructs the pilot (in both ears) to reduce the engine power. Box 28 instructs the pilot (in one ear only) to level the wings, giving voice information to the pilot's ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved. Once the wings are leveled, box 29 instructs the pilot by voice (in both ears) to gently raise the aircraft's nose and add power until a positive climb is established and the aircraft is back at the minimum safe altitude for the area it is flying over.

Conversely, if a nose-high condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications from computer 15 to recover the aircraft from this condition. Box 30 instructs the pilot (in both ears) to increase the engine power. Box 31 instructs the pilot (in both ears) to gently lower the nose of the aircraft and add power until a level attitude is established and the aircraft is back at the minimum safe altitude for the area. Box 32 instructs the pilot (in one ear) to level the wings, speaking into the ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved.

Page 8, line 16:

If the roll rate determined from the timed GPS signals becomes excessive (i.e.,

21

past the 2 minute turn standard) a voice warning to this effect is delivered to the pilot (block 34) and the pilot is given instructions (block 35) for getting the aircraft into a standard turn rate, for notifying the pilot when the standard turn rate is established, and for notifying the pilot when the aircraft passes through the eight cardinal headings.

Clarification from the figures:
Fig. 2:

If a nose-low condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications and instructions from the computer 15 to assist him or her to restore the aircraft to safe attitude and altitude. Box 27 instructs the pilot (in both ears) to reduce the engine power. Box 28 instructs the pilot (in one ear only) to level the wings, giving voice information to the pilot's ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved. Once the wings are leveled, box 29 instructs the pilot by voice (in both ears) to gently raise the aircraft's nose and add power until a positive climb is established and the aircraft is back at the minimum safe altitude for the area it is flying over.

Conversely, if a nose-high condition of the aircraft is determined (box 26), the pilot receives appropriate voice notifications from computer 15 to recover the aircraft from this condition. Box 30 instructs the pilot (in both ears) to increase the engine power. Box 31 instructs the pilot (in both ears) to gently lower the nose of the aircraft and add power until a level attitude is established and the aircraft is back at the minimum safe altitude for the area. Box 32 instructs the pilot (in one ear) to level the wings, speaking into the ear (left or right) corresponding to the low wing, and then monitors the wings level and gives a voice prompt to the pilot when wings level is achieved.

Fig 3:

22

If the roll rate determined from the timed GPS signals becomes excessive (i.e., past the 2 minute turn standard) a voice warning to this effect is delivered to the pilot (block 34) and the pilot is given instructions (block 35) for getting the aircraft into a standard turn rate, for notifying the pilot when the standard turn rate is established, and for notifying the pilot when the aircraft passes through the eight cardinal headings.

Claim 3

Claimed means:

data processing means comprises: a safe altitude/approach database for the terrain over which the aircraft is flying;

Clarification from the specification:

Page 5, line 3:

Stored in the computer 15 is an MSA/approach database 14 which provides information regarding the approaches being flown by the aircraft, the minimum descent altitude, decision altitude, and minimum safe altitude for airways and sectors, taking into account the terrain over which the plane is flying and obstacles on the ground along the flight path that determine the minimum safe altitude. This database is interfaced with the remainder of the system to provide warnings of an unsafe altitude.

Clarification from the figures:

Fig 1:

Stored in the computer 15 is an MSA/approach database 14.

Claimed means:

23

...computer means for comparing said continuous altitude determination against said database to initiate a voice warning to the pilot when the aircraft is at an unsafe altitude.

Clarification from the specification:

Page 4, line 20:

...a microprocessor-based computer 15 for collating and processing the information supplied to it from the receiver R, the vacuum pressure sensor 11, gyros 12 and 13, and other sources, as explained hereinafter. This computer runs an expert system algorithm, as explained hereinafter.

Stored in the computer 15 is an MSA/approach database 14 which provides information regarding the approaches being flown by the aircraft, the minimum descent altitude, decision altitude, and minimum safe altitude for airways and sectors, taking into account the terrain over which the plane is flying and obstacles on the ground along the flight path that determine the minimum safe altitude.

Clarification from the figures:

Fig. 1:

Stored in the computer 15 is an MSA/approach database 14.

Claim 4

Claimed means:

24

means for disabling the comparison of said continuous altitude determination against said database when the aircraft is within a predetermined approach distance to an airport.

Clarification from the specification:

Page 5, line 3:

Stored in the computer 15 is an MSA/approach database 14 which provides information regarding the approaches being flown by the aircraft, the minimum descent altitude, decision altitude, and minimum safe altitude for airways and sectors, taking into account the terrain over which the plane is flying and obstacles on the ground along the flight path that determine the minimum safe altitude. This database is interfaced with the remainder of the system to provide warnings of an unsafe altitude. Within three miles of an airport this feature automatically de-activates to enable the landing approach to be performed without false alarms being triggered.

Claim 5

Claimed means:

means for comparing said continuous altitude determination against said database to initiate a voice warning to the pilot when the aircraft is at an unsafe altitude.

Clarification from the specification:

Page 4, line 20:

a microprocessor-based computer 15 for collating and processing the information supplied to it from the receiver R, the vacuum pressure sensor 11, gyros 12 and 13, and

25

other sources, as explained hereinafter. This computer runs an expert system algorithm, as explained hereinafter.

Stored in the computer 15 is an MSA/approach database 14 which provides information regarding the approaches being flown by the aircraft, the minimum descent altitude, decision altitude, and minimum safe altitude for airways and sectors, taking into account the terrain over which the plane is flying and obstacles on the ground along the flight path that determine the minimum safe altitude.

Clarification from the figures:

Fig. 1:

Stored in the computer 15 is an MSA/approach database 14.

26

Claim 6

Claimed means:

means for disabling the comparison of said continuous altitude determination against said database when the aircraft is within a predetermined approach distance to an airport.

Clarification from the specification:

Page 5, line 3:

Stored in the computer 15 is an MSA/approach database 14 which provides information regarding the approaches being flown by the aircraft, the minimum descent altitude, decision altitude, and minimum safe altitude for airways and sectors, taking into account the terrain over which the plane is flying and obstacles on the ground along the flight path that determine the minimum safe altitude. This database is interfaced with the remainder of the system to provide warnings of an unsafe altitude. Within three miles of an airport this feature automatically de-activates to enable the landing approach to be performed without false alarms being triggered.

Claim 11

Claimed means:

means for disabling the comparison of said continuous altitude determination against said database when the aircraft is within a predetermined approach distance to an airport.

Clarification from the specification:
Page 5, line 3:

Stored in the computer 15 is an MSA/approach database 14 which provides information regarding the approaches being flown by the aircraft, the minimum descent

27

altitude, decision altitude, and minimum safe altitude for airways and sectors, taking into account the terrain over which the plane is flying and obstacles on the ground along the flight path that determine the minimum safe altitude. This database is interfaced with the remainder of the system to provide warnings of an unsafe altitude. Within three miles of an airport this feature automatically de-activates to enable the landing approach to be performed without false alarms being triggered.

In view of these clarifications, the Applicants respectfully request the Examiner withdraw the objection to the claims.

Means-plus-function language must be evaluated in accordance with 35 U.S.C. § 112, sixth paragraph.

Applicants respectfully note that claim 1, which was objected to by the examiner because claimed "means" in this means-plus-function format claim is unclear in the specification and 3 informal drawings, includes means-plus-function language, as set forth in 35 U.S.C. § 112, paragraph 6, *and should be examined in accordance with this body of law.* As may be appreciated, with respect to 35 U.S.C. § 112, paragraph 6, an Examiner "may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination." *In re Donaldson Co.,* 29 U.S.P.Q.2d 1845 (Fed. Cir. 1994); *see also* Manual of Patent Examining Procedure § 2181. Applicants note that proper interpretation of this claim must be performed with reference to the structure provided in the specification. Particularly, with regard to the "means for processing said altitude, attitude and roll rate determinations" recitation of claim 1, Applicants' specification discloses:

a microprocessor-based computer for collating and processing the information supplied to it from the receiver, the vacuum pressure sensor, gyros, and other sources.

28

This computer runs an expert system algorithm. This computer receives, from a GPS feed, GPS/WAAS navigation signals which tell the instantaneous air speed of the aircraft, its altitude, and its magnetic heading to initiate voice warnings and recovery instructions to the pilot. A large delta in the aircraft's altitude, an excursion to an unsafe altitude, a large delta in the aircraft's heading, an increase or decrease in airspeed, or a combination of two or more of these factors will trigger a scoring system programmed in the computer to indicate an unusual attitude and will instantly analyze this unusual attitude to initiate recovery voice instructions to the pilot- for performing the recited function. *See, e.g.*, Application, Page 3, line 20 and Page 5, line 11; FIGS. 1-3.

For at least these reasons among others, the Applicant respectfully requests withdrawal of the rejections under 35 U.S.C. § 102.

Conclusion

The Applicant respectfully submits that all pending claims should be in condition for allowance. However, if the Examiner believes certain amendments are necessary to clarify the present claims or if the Examiner wishes to resolve any other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: 2/15/07

Arthur M. Dula
Registration No. ~~#######~~ 26,869
3106 Beauchamp Street
Houston, Texas 77009
(713) 861-1960

29